

Two new species of the coffinfish genus *Chaunax* (Lophiiformes: Chaunacidae) from the Indian Ocean

HSUAN-CHING HO^{1,2,4} & PETER R. LAST³

¹National Museum of Marine Biology & Aquarium, Pingtung, Taiwan. E-mail: ogceho@gmail.com

²Institute of Marine Biodiversity & Evolutionary Biology, National Dong Hwa University, Pingtung, Taiwan

³Wealth from Oceans Flagship, CSIRO Marine & Atmospheric Research, Hobart, Tasmania, Australia. E-mail: peter.last@csiro.au

⁴Corresponding author

Abstract

Two new coffinfishes, *Chaunax nebulosus* n. sp. and *Chaunax africanus* n. sp., are described from the Indian Ocean. Both species belong to the *C. fimbriatus*-species group which is characterised by having filaments on the dorsal head and a complex color pattern on the dorsal surface. They are morphometrically and meristically conservative but differ in coloration. *Chaunax nebulosus* can be distinguished from its closest relatives by its dense covering of very small, irregular grayish green spots and having 5 small blackish markings on its dorsal surface. *Chaunax africanus* can be distinguished from other members in having a colour pattern of long narrow brown bars on the dorsal-fin base and head (forming a radiate pattern around the eye), and a complex white reticulate pattern (often double-lined) over the entire dorsal surface. Comments on species occurring in Indian Ocean and the status of members of *C. fimbriatus*-species group are also provided.

Key words: Pisces, *Chaunax*, coffinfish, taxonomy, new species, Indian Ocean

Introduction

The chaunacid anglerfish genus *Chaunax*, also known as coffinfishes or sea toads, comprises 17 species. They are small benthic fishes (usually <40 cm total length) inhabiting continental shelves and slopes, mainly in tropical and warm temperate parts of the Atlantic, Indian and Pacific oceans. Most of the species occur in the Indo-west Pacific region, except for *C. pictus* Lowe 1846, *C. stigmaeus* Fowler 1946 and *C. suttkusi* Caruso 1989 from the Atlantic Ocean, and *C. latipunctatus* Le Danois 1984 from the eastern Pacific Ocean. Caruso (1989) divided the species into two primary subgroups (i.e. *C. fimbriatus*-species group and *C. pictus*-species group), and Ho & Shao (2010) added a third subgroup, the *C. abei*-species group, formerly included in the *C. fimbriatus*-species group.

Two species have been described from the Indian Ocean: *C. apus* Lloyd 1909a and *C. flammeus* Le Danois 1979 (originally a subspecies of *C. umbrinus* Gilbert 1905), both of which are confirmed to be valid in the present study. Smith in Smith & Heemstra (1986) recorded *C. penicillatus* McCulloch 1915 and *C. pictus* from South Africa; the latter is confirmed to be a misidentification from our examination. Although *C. umbrinus* has also been listed from the Indian Ocean, these records need to be verified.

The Australian coffinfishes were examined provisionally by the second author as part of a bioregionalisation of Australian seas for the purposes of regional marine planning (Last et al. 2005). Several unresolved taxonomic issues were identified and some of the species were thought to be undescribed. During a recent visit to Australian fish collections by the first author, one of these species belonging to *C. fimbriatus*-species group and held in collections of the Australian Museum (Sydney), Museum Victoria (Melbourne) and the CSIRO (Hobart), was confirmed to be undescribed.

Moreover, two additional specimens of an undescribed species, also belong to *C. fimbriatus*-species group, were found in the collection of the South Africa Institute of Aquatic Biology (Grahamstown). This species has a unique and highly distinctive color pattern. Coffinfishes offer relatively few useful identifying characters so coloration can be used to distinguish some species where the pattern is consistent and retained after preservation.

The purposes of this study are to formally describe and name these two new species, to verify the historical records of the *C. fimbriatus*-species group, and to document newly recognized species from the Indian Ocean.

Methods and material

Standard length (SL) and head length (HL) are used throughout. Methods for taking measurements and counts generally followed Caruso (1989), and were partly modified by Ho et al. (2013). Counts of lateral-line neuromasts follow Caruso (1989) with minor modifications, as demonstrated in Ho et al. (2013: fig. 1). Gill-raker counts were made from the right side in all specimens with dissection. Rakers on the first gill arch (GR_i) were counted on the outer side (upper limb) + inner side (lower limb); those on the second (GR_{ii}) and third gill arches (GR_{iii}) are paired and were counted on the outer side only; rakers on the fourth gill arch (GR_{iv}) were counted only from the row on the outer side. Type specimens are deposited in the Australian Museum, Sydney (AMS), the Australian National Fish Collection, based at CSIRO Marine and Atmospheric Research, Hobart (CSIRO), Pisces Collection of National Museum of Marine Biology & Aquarium, Taiwan (NMMB-P), Museum Victoria, Melbourne (NMV) and South Africa Institute of Aquatic Biology (SAIAB, Grahamstown).

Taxonomy

Chaunax nebulosus n. sp.

English name: Eyespot coffinfish

Figs. 1A–B, 2A–D; Table 1

Holotype. CSIRO H 5200-01 (212 mm SL), north of Monte Bello Islands, Western Australia, 19°36'S, 115°27'E, 245 m, 29 Oct. 1998.

Paratypes. 11 specimens, 106–206 mm SL. AMS I.22807-055 (136 mm SL), North-West Shelf, 175 km north of Port Hedland, Western Australia, 18°32'S, 118°17'E, 200–204 m, 2 Apr. 1982. CSIRO H5196-04 (201 mm SL) and CSIRO H 5196-05 (155 mm SL), north of Dampier Archipelago, Western Australia, 19°09'S, 116°26'E, 220 m, 17 Oct. 1998. CSIRO H 5198-02 (139 mm SL), north of Monte Bello Islands, Western Australia, 19°33'S, 115°37'E, 250 m, 28 Oct. 1998. CSIRO H 6372-05 (105 mm SL), west of Lancelin, Western Australia, 31°00'S, 114°49'E, 393 m, 1 Dec. 2005. CSIRO H 6414-23 (151 mm SL), west of Perth, Western Australia, 31°50'S, 115°01'E, 318 m, 19 Apr. 2006. CSIRO H.6460-01 (117 mm SL), west of Perth, Western Australia, 31°37'S, 114°57'E, 404 m, 19 Nov. 2005. NMMB-P19375 (136 mm SL), same data as CSIRO H 5198-02. NMV A.9641 (2, 106–170 mm SL), 50 km west of Green Head, 30°0.01'S, 114°27.8'E, 380 m, 8 Feb. 1991. NMV A.9665 (206 mm SL), 35 km north-west of Rottnest Island, Western Australia, 31°55.2'S, 115°10.2'E, 320–850 m, 11 Feb. 1991.

Diagnosis. A member of the *C. fimbriatus*-species group distinguished from its congeners by its dense covering of minute grayish-green irregular spots, 5 large blackish dorsal markings and a combination of the following characters: 3–6 pairs of spinules bridging each neuromast; modally 14 pectoral-fin rays; mainly 8–9 rakers on second gill arch; illicium long and slender; illicial trough elongate, longer than wide; numerous thin pale cirri with brown tips on esca; gill chamber pale with large blackish patch on inner wall of opercle; peritoneal membrane pale; and lateral-line neuromast distribution: BB'=3–5 (mainly 4), BD=2–3 (2), CD=5–7 (6), FG=3–4 (3), GH=10–12 (10 or 11), BI=29–35.

Description. Morphometric and meristic data are given in Table 1; following data summary is provided for holotype and range of all types (if different) in parentheses.

Dorsal-fin rays III, 12 (11–12, 1 with 11); pectoral-fin rays 14 (13–14, 1 with 13); anal-fin rays 7; caudal-fin rays 9. Head length 2.4 (2.3–2.5) in SL; head width 5.5 (4.8–5.6) in SL, 2.3 (1.9–2.3) in HL; pre-dorsal length 1.9 (1.8–2.1) in SL; pre-gill opening length 1.5 (1.5–1.7) in SL; pre-preopercular length 3.7 (3.4–3.8) in SL, 1.5 (1.4–1.6) in HL; upper jaw 5.2 (4.7–5.6) in SL, 2.1 (2.0–2.2) in HL; illicial length 8.3 (8.3–12.4) in HL; eye diameter 6.6 (5.1–6.6) in HL; post-dorsal fin length 6.4 (5.8–6.4) in SL, 2.6 (2.3–2.6) in HL; post-anus length 3.8 (3.3–4.0) in SL, 1.6 (1.3–1.7) in HL; post-anal fin length 7.0 (6.6–7.8) in SL, 2.8 (2.7–3.1) in HL; caudal peduncle depth 4.3 (4.1–4.7) in HL; caudal-fin length 3.5 (2.9–3.5) in SL, 1.4 (1.2–1.4) in HL.

TABLE 1. Selected proportional measurements of the two new *Chaunax* species described in this study.

	<i>C. nebulosus n. sp.</i>		<i>C. africanus n. sp.</i>	
	Holotype	All types	Holotype	Paratype
SL (mm)	212	106–212 (n=12)	227	142
% SL		Mean (Range)	SD	
Head length	40.8	41.1 (39.3–43.2)	1.0	43.6
Head width	18.0	19.0 (17.8–21.0)	0.9	23.8
Pre-preopercular length	27.4	27.8 (26.2–29.5)	1.0	28.9
Pre-dorsal length	53.4	52.3 (48.5–56.4)	2.5	50.2
Pre-gill opening length	65.0	62.9 (60.5–65.0)	1.5	65.2
Illicial length	4.9	4.1 (3.2–4.9)	0.4	4.4
Eye diameter	6.2	7.4 (6.2–8.1)	0.7	6.5
Upper-jaw length	19.1	19.6 (17.9–21.3)	1.0	22.5
Post-dorsal length	15.7	16.5 (15.7–17.3)	0.5	16.3
Post-anus length	26.1	28.3 (25.1–30.3)	1.8	35.7
Post-anal length	14.4	14.1 (12.8–15.2)	0.7	11.5
Caudal-peduncle depth	9.4	9.3 (8.8–9.9)	0.3	9.7
Caudal-fin length	28.8	31.0 (28.8–34.0)	1.7	27.8

Head globular, skull elevated above rest of body posteriorly; trunk and tail robust, weakly compressed, tapering posteriorly to caudal-fin base; ventral surface of belly flattened; skin thick, loose and flaccid; interspace between eyes broad, convex; caudal peduncle short. Eyes rounded, directed laterally to dorsolaterally; covered by dermal membrane, broadly connected to adjoining skin, forming clear “window”.

Illicium stout, length subequal to eye diameter; esca depressed, forming a large central plate bearing many thin cirri; second dorsal-fin spine close to illicium, embedded under skin and not detectable externally; third dorsal-fin spine situated at about midpoint of predorsal distance, embedded beneath skin. Illicial trough slender, narrow anteriorly and much broader posteriorly, slightly concave, its length more than twice its width. Origin of soft dorsal fin slightly behind midpoint of body; pectoral fin emerging laterally near midpoint of body, slightly anterior to a vertical through gill opening; pelvic fin on breast, well anterior to pectoral fin; anus situated near posterior fourth of body; anal-fin origin near posterior fifth of body, its tip well short of caudal-fin base when depressed.

Nostrils anterior to eye; anterior nostril surrounded by a fleshy membrane, its posterior part taller than anterior part; posterior nostril a circular depression; mouth wide, superior, its opening nearly vertical; lower jaw robust, protruding slightly in front of upper jaw; maxilla tapering, narrow dorsally, broadly expanded ventrally; blunt symphysial spine on symphysis of lower jaw.

Broad transparent membrane on first gill arch; first ceratobranchial well connected to opercular wall and first epibranchial entirely free of opercular wall; gill filaments present on second to fourth gill arches, two rows of gill filaments in second and third gill arches, single row of gill filaments on fourth gill arch; filaments on inner rows of third and fourth gill arches about two-thirds length of filaments on other arches; inner surface of fourth gill arch completely connected to body. Single row of 12 (11–14) rakers on 1st gill arch, 3 (2–4) on upper limb and 9 (8–10) on lower limb, 8 (8–10) rakers on outer row of 2nd arch, 8 (8–9) rakers on outer row of 3rd arch, and single row of 6 (6–8) rakers on 4th arch.

Interspaces of lateral-line neuromast complex slightly longer than the width of neuromast; 3–6 pairs of short spines bridging each neuromast. Lateral-line neuromast counts: supraorbital (AB) 11 (10–12, mainly 11); premaxillary (AC) 8; upper preopercular (BD) 2 (2–3, mainly 2); infraorbital (CD) 6 (5–6, mainly 6); lower preopercular (DG) 3; mandibular (EF) 6 (4–7, mainly 6); hyomandibular (FG) 3 or 4 (mainly 3); pectoral (GH) 10 or 11 (10–12, mainly 10–11); anterior body proper (BB') 4 (3–5, mainly 4); supratemporal (BB) 6; and body proper (BI) 29–34 (mainly 31), including 2–3 (mainly 2) on caudal fin.

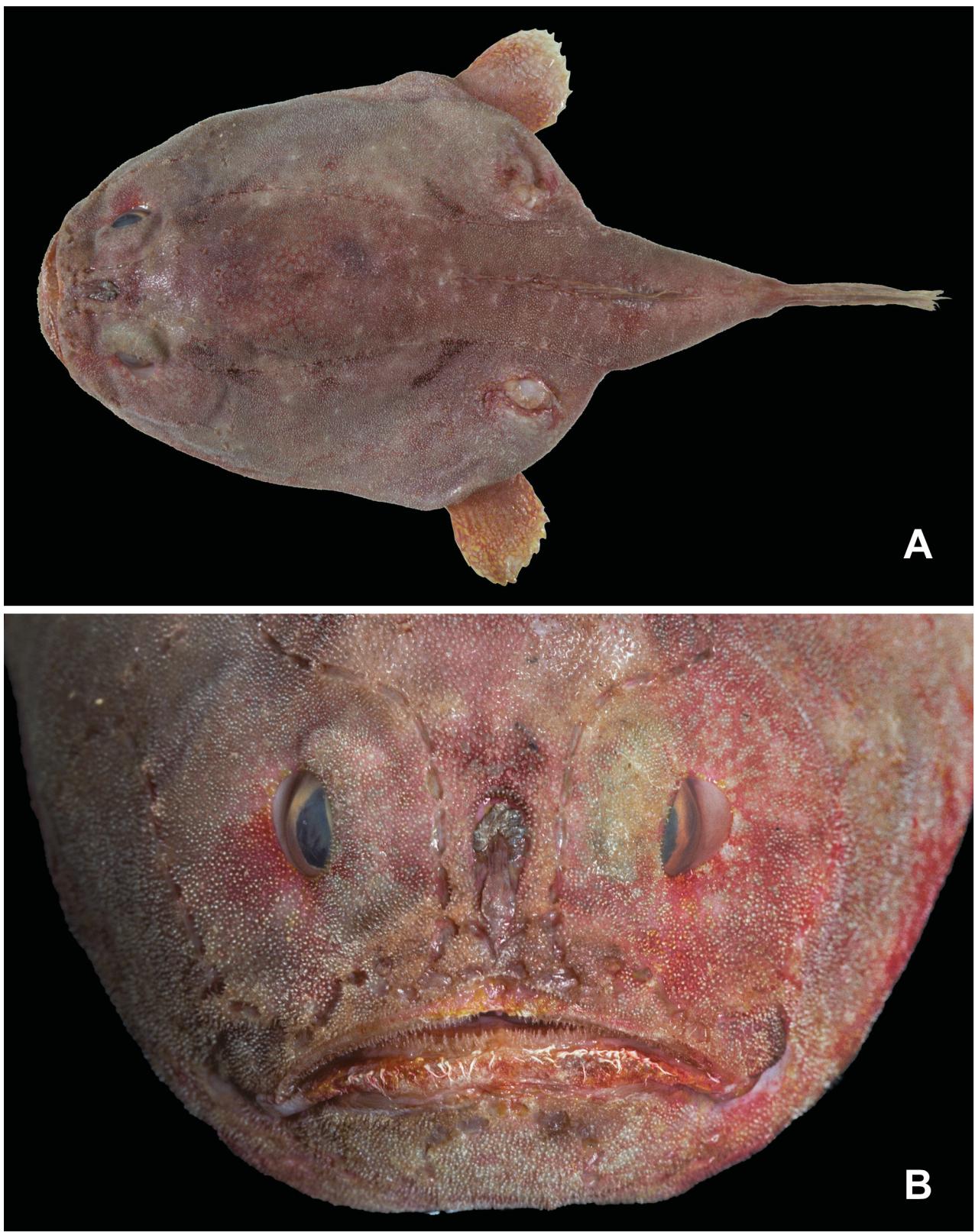


FIGURE 1. *Chauanx nebulosus* n. sp., holotype, CSIRO H 5200-01, 212 mm SL, fresh condition. A. Dorsal view. B. Closed-up of dorsal surface of head.

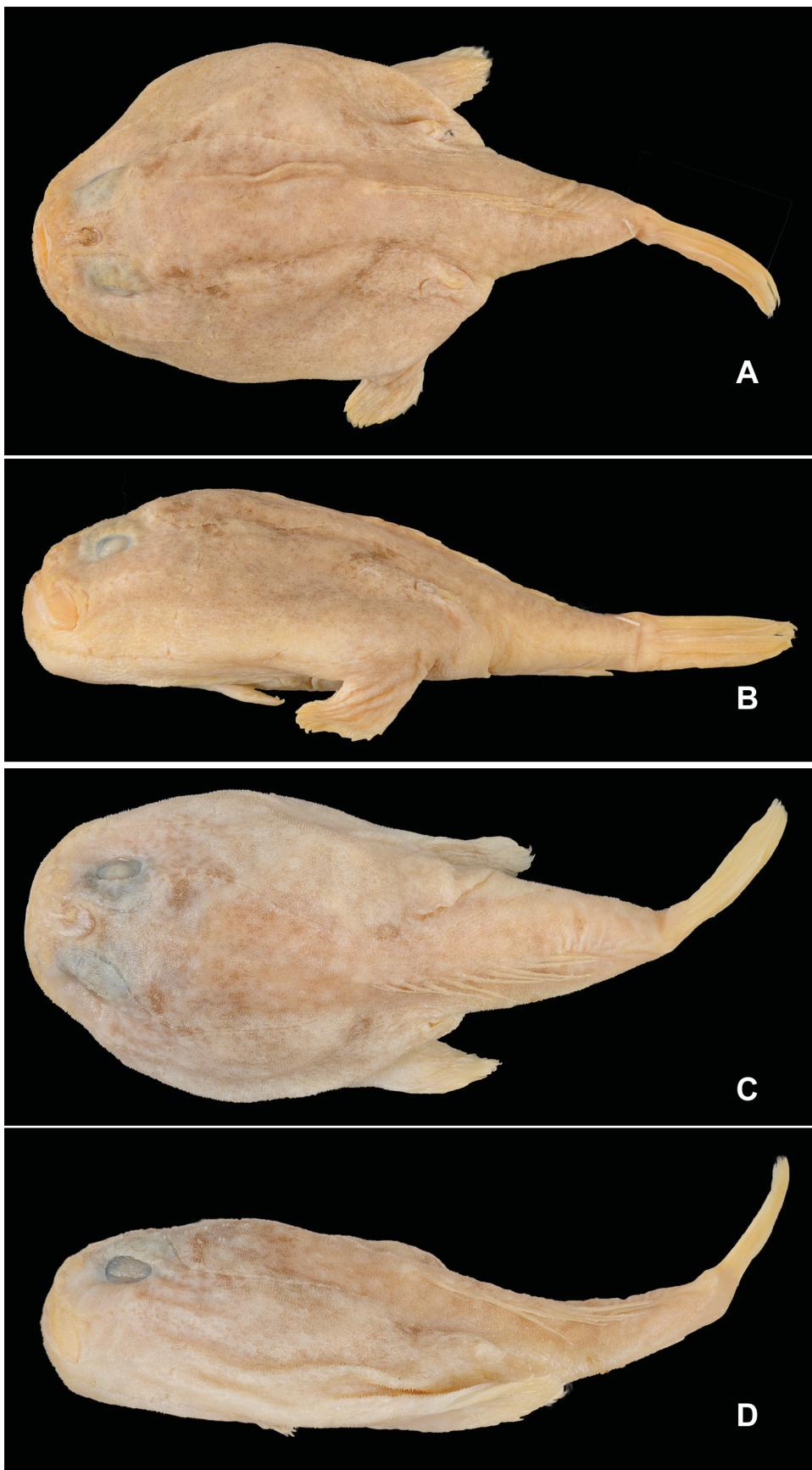


FIGURE 2. *Chauanx nebulosus* n. sp., preserved condition. A.-B. Holotype, CSIRO H5200-01, 212 mm SL. C-D. Paratype, NMMB-P19375, 136 mm SL. A, C. Dorsal view. B, D. Lateral view.



FIGURE 3. *Chaunax reticulatus* Ho et al., 2013, non-type, preserved, CSIRO H355-01, 175 mm SL, Tasman Sea.

Dorsal surface covered by simple, stout spinules, except for eye window, lips, distal fifth of dorsal surface and entire ventral surface of pectoral fin, distal half of dorsal surface and entire ventral surface of pelvic fin, entire anal fin and its base, membranes of dorsal fin, anus, and caudal-fin rays. Ventral surface covered by shorter simple spinules. Jaws and body margin along lateral line densely covered with simple, stout cirri; entire dorsal surface covered by scattered simple cirri, relatively dense on supraocular membrane and lower portion of maxilla; cirri on dorsal surface and supraocular membrane accompanied by a strong spinule, taller than those adjacent. Cirri absent from ventral surface.

Coloration. When fresh (Figs. 1A–B), reddish pink on most of dorsal surface, including soft dorsal-fin rays, densely covered with minute to very small, irregular, grayish or greenish spots, each covering several to more than 20 spinules; those of lateral body fused into large patches, appearing grayish red; small to large rich red patches scattered over dorsal surface, including illicial trough and illicial stem; five obvious larger dark markings, one at posterior margin of illicial trough, a symmetric pair on each dorsal surface of sphenotic region, extending posteroventrally to cross body lateral line in holotype, and a symmetrical pair at same vertical to slightly behind origin of dorsal fin, below body lateral line and extending anteroventrally; small irregular yellowish spots on dorsal surface of pectoral fin; dense coverage of bright whitish spots and short vermiculations on central cranium; spinule bases pale to grayish. Ventral surfaces paler. Cirri of dorsal surface, jaws and lateral body white. Esca vivid white with deep brown cirri. Eye yellowish pink with a dark blue pupil.

When preserved (Figs. 2A–D), dorsal surface, including soft dorsal-fin rays, creamy white to pinkish; densely covered with numerous, very small, grayish spots (each ranging from 1 to several spinule bases in width), some fused to form larger scattered, irregular patches; five larger patches mentioned above becoming grayish; cirri on body transparent; esca with transparent base and brown-tipped cirri; pectoral fin with faded grayish spots, pale on distal margin; ventral surface uniformly pale. Gill chamber pale, with large grayish patch on inner opercular wall; gill arches, buccal cavity, peritoneal membrane and external lining of stomach pale.

Size. Reaches at least 212 mm SL.

Distribution. Known from the upper continental slope off northwestern Australia between longitudes 18° and 32° S. All specimens were collected at depths of 218–380 m, with the exception of a specimen collected from a trawl station covering a 320–850 m depth interval.

Etymology. Derived from the Latin *nebula*, meaning "cloudy" (more or less), and referring its unique diffuse grayish green colour pattern overlain dorsally with five black spots.

Remarks. *Chaunax nebulosus n. sp.* can be distinguished from congeners of the *C. fimbriatus*-species group (*sensu* Ho & Shao 2010, not Caruso 1989) by its dusky colour pattern overlain with five brownish eye-sized spots on the dorsal surface. It is most similar to *C. reticulatus* Ho, Roberts & Stewart 2013, but differs in aspects of its color pattern (Figs. 1–2, compared to Fig. 3) and having mainly 10–11 neuromasts in the pectoral series (GH) (vs. mainly 12). It differs from *C. fimbriatus* Hilgendorf 1879 mainly in lacking two large white spots on the dorsal surface, and having 6 neuromasts in the infraorbital series (CD) and 3 in the lower preopercular series (DG) (vs. 7 and 4 respectively); and from *C. umbrinus* mainly in lacking a very fine reticulate pattern and having mainly 6 neuromasts in the infraorbital series and 10–11 in the pectoral series (vs. 7 and 13 respectively).

TABLE 2. Meristic data for all types of the two new *Chaunax* species described in this study; counts were taken from both sides when paired. Numbers in parentheses indicate the number of specimens or sides with that value.

	<i>C. nebulosus n. sp.</i>		<i>C. africanus n. sp.</i>	
	Holotype	All types (n=12)	Holotype	Paratype
Dorsal-fin rays	12	11(1), 12(11)	12	12
Pectoral-fin rays	14	13(2), 14(22)	14	13
Anal-fin rays	7	7(12)	7	6
Gill rakers (n=8)				
GRi	12	11(1), 12(4), 13(2), 14(1)	12	13
GRii	8	8(4), 9(3), 10(1)	8	9
GRiii	8	8(4), 9(4)	9	9
GRiv	6	6(4), 7(3), 8(1)	8	7
Lateral-line neuromasts				
AB	11	10(2), 11(20), 12(2)	11	11
AC	8	8(24)	8	8
BD	2	2(22), 3(2)	2	2
CD	6	5(1), 6(18), 7(5)	7	6
DG	3	3(24)	3	3
EF	6	4(1), 5(1), 6(21), 7(1)	6	6
FG	4/3	3(20), 4(4)	3	3
GH	11/10	10(13), 11(10), 12(1)	11/12	10
BB'	4	3(2), 4(20), 5(2)	4	4
BI	31	29(4), 30(2), 31(7), 32(7), 33(2), 34(1), 35(1)	31	32

Chaunax africanus n. sp.

English name: African Coffinfish

Figs. 4A–C, 5A–C; Table 1

Holotype. SAIAB 74595 (227 mm SL), 18°2.1'S, 37°37.2' E, north of Beira, Mozambique, Africa, western Indian Ocean, 162–200 m, 12 Aug. 2002.

Paratype. SAIAB 18878 (142 mm SL), collected together with the holotype.

Diagnosis. A member of the *C. fimbriatus*-species group distinguished from its congeners in having: body covered by variable-sized, irregular brownish patches and a complex white reticulate pattern; eye surrounded by prominent radiating brownish markings; 2–3 pairs of narrow brownish bars at dorsal-fin base; pale reticulate markings frequently double-lined; pattern extending forward to front of lower jaw, and over pectoral and caudal fins; 3–4 pairs of spinules bridging each neuromast; 8–9 rakers on second gill arch; illicium short and stout; illicial

trough small, oval in shape; numerous thin pale cirri with brown tips on esca; gill chamber pale; peritoneal membrane black; and lateral-line neuromast distribution BD=2, CD=6–7, FG=3, GH=10–12, BI=31–32.

Description. Morphometric and meristic details are given in Table 1; following data summary is provided for holotype, followed by those of paratype, if different, in parentheses.

Dorsal-fin rays III, 12; pectoral-fin rays 14 (13); anal-fin rays 7 (6); caudal-fin rays 9. Head length 2.3 in SL; head width 4.2 (4.1) in SL, 1.8 in HL; pre-dorsal length 2.0 (1.9) in SL; pre-gill opening length 1.5 (1.6) in SL; pre-preopercular length 3.5 (3.4) in SL, 1.5 in HL; upper jaw 4.5 (4.6) in SL, 1.9 (2.0) in HL; illicial length 9.9 (15.5) in HL; eye diameter 6.7 (6.2) in HL; post-dorsal fin length 6.1 (5.7) in SL, 2.7 (2.5) in HL; post-anus length 2.8 (3.2) in SL, 1.2 (1.4) in HL; post-anal fin length 8.7 (7.3) in SL, 3.8 (3.2) in HL; caudal peduncle depth 4.5 (4.4) in HL; caudal-fin length 3.6 (3.5) in SL, 1.6 (1.5) in HL.

Head globular, skull elevated above rest of body posteriorly; trunk and tail robust, weakly compressed, tapering posteriorly to caudal-fin base; ventral surface of belly flattened; skin thick, loose and flaccid; interspace between eyes broad, convex; caudal peduncle short. Eyes rounded, directed laterally; covered by dermal membrane, broadly connected to adjoining skin, forming clear “window”.

Illicium stout and short, its length less than eye diameter; esca depressed, forming a large central plate bearing many thin cirri; second dorsal-fin spine close to illicium, embedded under skin and not detectable externally; third dorsal-fin spine situated at about midpoint of predorsal distance, embedded beneath skin. Illicial trough oval-shaped, concave, slightly narrow anteriorly and much broader posteriorly, its length slightly more than its width. Origin of soft dorsal fin slightly behind midpoint of body; pectoral fin emerging laterally near midpoint of body, slightly anterior to a vertical through gill opening; pelvic fin on breast, well anterior to pectoral fin; anus situated near posterior fourth of body; anal-fin origin near posterior fifth of body, its tip nearly reaching caudal-fin base when depressed.

Nostrils anterior to eye; anterior nostril surrounded by fleshy membrane, its posterior part taller than anterior part; posterior nostril a circular depression; mouth wide, superior, its opening nearly vertical; lower jaw robust, protruding slightly in front of upper jaw; maxilla tapering, narrow dorsally, broadly expanded ventrally; blunt symphysial spine on symphysis of lower jaw.

Broad transparent membrane on first gill arch; first ceratobranchial well connected to, and first epibranchial entirely free of opercular wall; gill filaments present on second to fourth gill arches, two rows of gill filaments in second and third gill arches, single row of gill filaments on fourth gill arch; filaments on inner rows of third and fourth gill arches about two-thirds length of filaments on other arches; inner surface of fourth gill arch completely connected to body. Single row of 12 (13) rakers on 1st gill arch, 3 on upper limb and 9 (10) on lower limb, 8 (9) rakers on outer row of 2nd arch, 9 rakers on outer row of 3rd arch, and single row of 8 (7) rakers on 4th arch.

Interspaces of lateral-line neuromast complex slightly longer than its width; 3–4 (mainly 3) pairs of short spines bridging each neuromast. Lateral-line neuromast counts: supraorbital (AB) 11; premaxillary (AC) 8; upper preopercular (BD) 2; infraorbital (CD) 6 (7); lower preopercular (DG) 3; mandibular (EF) 6; hyomandibular (FG) 3; pectoral (GH) 11 or 12 (10); anterior body proper (BB') 4; supratemporal (BB) 6; and body proper (BI) 31 (32), including 2 or 3 on caudal fin.

Dorsal surface covered by simple, stout spinules, except for eye window, lips, distal fifth of dorsal surface, entire ventral surface of pectoral fin, distal half of dorsal surface, entire ventral surface of pelvic fin, entire anal fin and its base, membranes of dorsal fin, anus, and caudal-fin rays. Ventral surface covered by slightly shorter, firm spinules. Jaws and body margin along lateral line densely covered with simple, stout cirri; entire dorsal surface covered by scattered simple cirri, relatively dense on supraocular membrane and lower portion of maxilla; cirri on dorsal surface and supraocular membrane accompanied by a strong spinule, taller than those adjacent. Cirri absent from ventral surface.

Coloration. Fresh color unknown. When preserved: dorsal and lateral surfaces of body still covered by prominent, variable-sized, irregular brownish patches overlain by a complex pale reticulate pattern. Pattern extending to front of chin, covering dorsal and caudal fins, and over dorsal surface of pectoral fin. Elongate brownish bars on head, and bases of dorsal and caudal fin; those around eye forming distinctive radiate pattern; symmetric pair of dark-brown markings at sphenotic region, lower preopercular region, and anterior to gill opening; symmetric pairs of bars at origin and middle portion of dorsal-fin base; medium patch near third dorsal-fin spine and at caudal fin base. Pale reticulate pattern complex; numerous small patches forming chain-like, double-lined pattern over dorsum and sides, and bordering large brownish patches; pale reticulate pattern

sometimes coalesced to form pale spots; larger brownish patches with scattered pale reticulations at lower opercular region. Uppermost 6 rays of caudal fin covered by alternating broad brown and narrow pale bands, lowermost three rays pale. Pelvic fin pale; underside of pectoral fin pale. Gill chamber, gill arches and buccal cavity pale; peritoneum blackish dorsally with scattered blackish patches on pale background ventrally; external lining of stomach pale.

Size. At least 227 mm SL, based on the two known types.

Etymology. The specific name *africanus* refers to the regional locality of the types, and its decorated color pattern is reminiscent of some strikingly coloured African animals, such as the giraffe.

Distribution. Known only from the two type specimens, collected from the outer continental shelf north of Beira, Mozambique, western Indian Ocean, at a depth of 162–200 m. Probably endemic in the southwestern Indian Ocean.

Remarks. *Chaunax africanus n. sp.* can be distinguished from other members of the *C. fimbriatus*-species group by its unique dorsal coloration. It is morphologically most similar to *C. nebulosus* and *C. reticulatus*, but differs mainly in having long, deep-brown bars on its body surface (vs. dark bars absent). It also differs from *C. fimbriatus*, as does *C. nebulosus*, mainly in lacking two large white spots on the dorsal surface, and having 6 neuromasts in the infraorbital series (CD) and 3 in the lower preopercular series (DG) (vs. 7 and 4 respectively); and from *C. umbrinus* in lacking a fine reticulate colour pattern and having 10–12 neuromasts in the pectoral series and 31–32 on the body proper (vs. 13 and 33–38, respectively).

Comments on members of the *C. fimbriatus*-species group. There are presently six species recognized in the *C. fimbriatus*-species group: *C. fimbriatus*, *C. umbrinus*, *C. flammeus*, *C. reticulatus*, *C. nebulosus n. sp.* and *C. africanus n. sp.* These species can be distinguished from all other members in the genus in having cirri present on the dorsal head (including a dense cluster above the eye), 3 or more (usually more) pairs of spines bridging the neuromasts, and, if present, a complex pattern of spots or reticulations on the dorsal surface.

Of the group, *C. flammeus* probably is the most poorly known nominal species, represented conclusively only by the unique holotype collected off northern Madagascar in the western Indian Ocean. Le Danios (1979) mentioned that the holotype had yellowish spots when fresh, which faded totally after preservation. Other species in *C. fimbriatus*-group retain a grayish or brownish color pattern dorsally, even after long-term preservation. *Chaunax flammeus* seems to be either plain reddish or with yellowish spots when fresh, distinguishing it from all other members of the *fimbriatus*-group.

Chaunax umbrinus is also poorly known, represented only by a few specimens collected from the Hawaiian Islands and the Emperor Seamount (based on specimens deposited in the National Science Museum, Tokyo). It can be distinguished mainly by its very fine reticulate pattern on the dorsal surface, even in large individuals. Other characters that might be used to distinguish it from its congeners in the *C. fimbriatus* group are mainly 13 neuromasts in the pectoral series (vs. 12 or less in its congeners) and slightly more numerous neuromasts on the body proper (33–38, vs. 29–37 in its congeners).

Chaunax fimbriatus is commonly collected from the seas around Japan and Taiwan, but has not been reliably reported from outside this part of the western North Pacific. The first author regularly collected this species from northern Taiwan, but only one specimen has been confirmed in the past 15 years from off southwestern Taiwan (off Tungkang). This species may inhabit the East China Sea and/or the Okinawa Trough, but rarely occurs in the South China Sea. *Chaunax fimbriatus* can be distinguished from its congeners mainly by the two large pale patches on its dorsal surface, one associated with the embedded third dorsal spine and another before the origin of the soft dorsal fin, and mainly 4 neuromasts in the lower preopercular series (vs. mainly 3 in other congeners). Record of this species from Hawaii (Chave & Mundy 1994) is misidentification of *Chaunacops cf. coloratus* and those of Mundy 2005), the western central Pacific (Caruso 1999), Australia (Paxton et al. 1989), and New Caledonia (Fricke et al. 2011), are most likely invalid and need to be checked.

Chaunax reticulatus (Fig. 3) was described from New Zealand, New Caledonia and eastern Australia. It differs from congeners mainly by the pale reticulate pattern on a grayish background in juveniles, and fine brownish spots on its dorsal surface in adults.

Comments on species occurring in the Indian Ocean. The following species have been described or recorded from the Indian Ocean: *C. apus*, *C. pictus*, *C. cf. fimbriatus* (*sensu* Hutchins 2001), *C. flammeus*, *C. umbrinus*, and *C. penicillatus*.

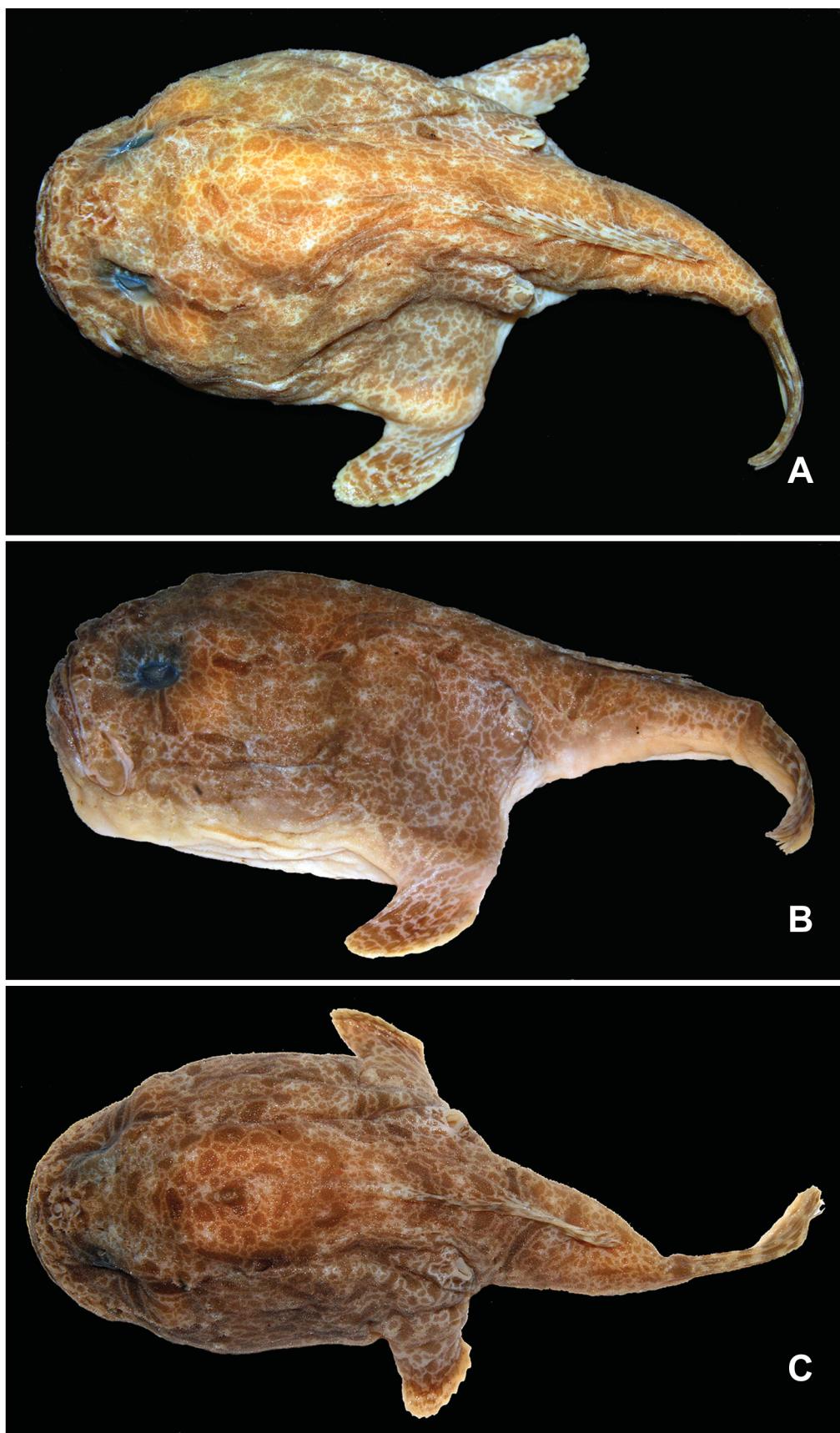


FIGURE 4. *Chaunax africanus* n. sp. A–B. Holotype, SAIAB 74595, 227 mm SL, preserved. A. Dorsal view. B. Dorsolateral view. C. Paratype, SAIAB 18878, 142 mm SL, dorsal view, preserved.

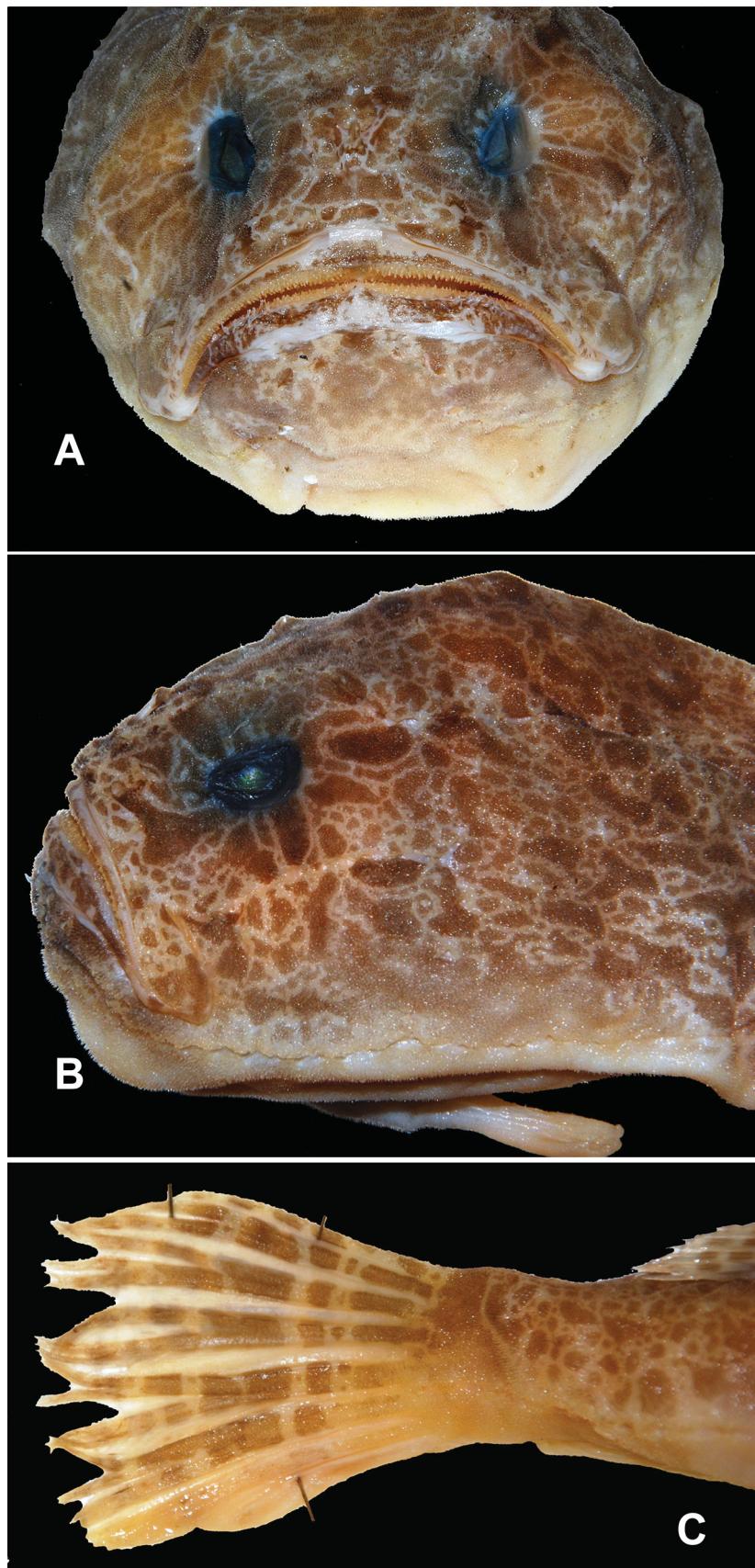


FIGURE 5. *Chaunax africanus* n. sp. A. Anterior view of head of holotype. B. Lateral view of left side of head of paratype. C. Lateral view of right caudal fin region of holotype (pins are used to expand the fin). Not to scale.

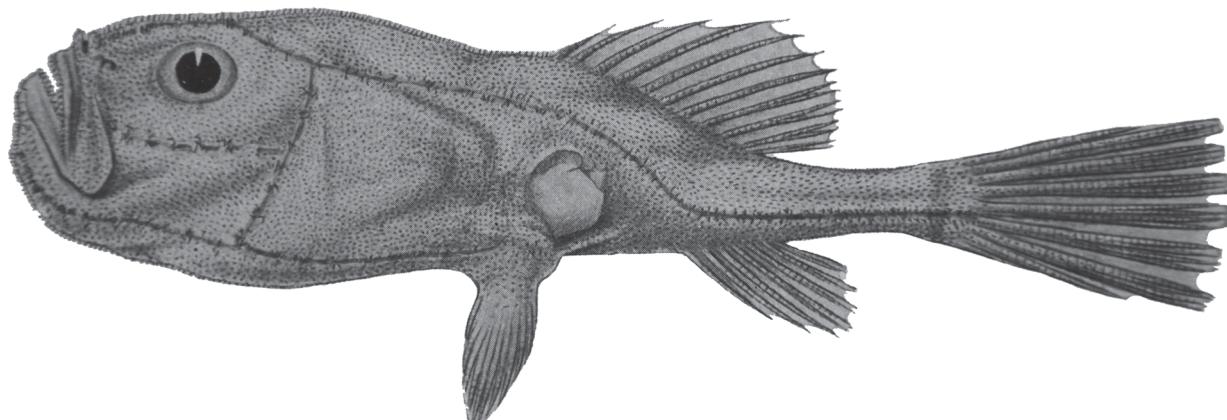


FIGURE 6. Original drawing of holotype of *Chaunax apus* Lloyd 1909, ZSI F2404/1. Modified from Lloyd (1909b: pl. 45, fig. 6).

Chaunax apus (Fig. 6) was described based on a single specimen collected from the Bay of Bengal. Only a few species had been described before this species, *C. pictus*, *Chaunax nuttingi* Garman 1896 (= *C. pictus*), *C. fimbriatus* and *C. umbrinus*. The first author examined the holotype of *C. apus* and determined that it belongs to the *C. abei*-species group (*sensu* Ho & Shao 2010), which is characterized by its lack of filaments on the dorsal surface of the head and flap-like cirri laterally on the body associated with the lateral line. As *C. pictus* is in the *C. pictus*-species group (*sensu* Caruso, 1989) and both *C. fimbriatus* and *C. umbrinus* are in the *C. fimbriatus*-species group (*sensu* Ho et al., 2013, not Caruso, 1989), none of the three is conspecific with *C. apus*. Le Danios (1979) suggested that *C. apus* was a junior synonym of *C. endeavouri* Whitley 1929, an impossibility as *C. apus* was described before *C. endeavouri*. We provisionally recognize *C. apus* as a valid species in the *C. abei*-species group but caution that it needs further study.

Although *C. pictus* has been recorded globally, confirmed identifications are only known from the Atlantic Ocean (Caruso, 1989) and Mediterranean Sea (Ragonese & Giusto, 2005); we have seen no specimens from outside the Atlantic Ocean among the substantial amount of material we examined. Based on our observations, records of *C. pictus* from outside the Atlantic Ocean are likely to be misidentifications of various species, notably *C. nudiventer* (New Zealand; Ho et al. 2013), *C. abei* (Japan and Taiwan), and some unidentified/undescribed species in Australia and South Africa (Ho, pers. observ.).

Le Danios (1979) described *C. umbrinus flammeus* based on a single specimen collected from northern Madagascar. Examination of the holotype and the original drawing show that it is clearly a member of *C. fimbriatus*-species group (*sensu* Ho et al., 2013). Its unique coloration indicates that it should be treated as a valid species distinct from the three other nominal species of the complex (i.e. *C. fimbriatus*, *C. umbrinus* and *C. reticulatus*), and two new Indian Ocean species described herein.

Although Fricke (1999) recorded *C. umbrinus* from Reunion Island, western Indian Ocean, no vouchers were indicated. He most likely confused Le Danios' (1979) *C. umbrinus flammeus* with *C. umbrinus*, a species now considered to be endemic to the Hawaiian region.

Hutchins (2001) recorded *C. cf. fimbriatus* from Western Australia but his species is most likely *C. nebulosus*, described in the present study.

Chaunax penicillatus was recorded from eastern Africa by Smith in Smith & Heemstra (1986). The vouchers were examined by the first author and the presence of this species in the Indian Ocean is confirmed. Additional specimens collected off Western Australia (deposited in AMS, NMV and CSIRO) and India (deposited in Cochin Unit, National Bureau of Fish Genetic Resources and Centre for Marine Living Resources & Ecology) were also examined by the first author.

Specimens of *Chaunax russatus* Ho et al., 2013, collected from the western Indian Ocean, are also recognized in this study and the species is now thought to exhibit a trans-Indian Ocean distribution.

Consequently, at least 6 species occur in Indian Ocean: *C. apus*, *C. flammeus*, *C. penicillatus*, *C. russatus* and the two new species described herein. Other unidentified, and possibly undescribed, species have been noticed in collections that require further study.

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